out of the former (such as limited entry) do not appear to be very applicable to the latter.

Nevertheless the book is a stimulating one that deals with a quite important aspect of international relations which has not been previously accorded adequate attention by social scientists.

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The Fulbright Program

Twenty years ago, the 79th Congress passed the Fulbright Act which established a program of educational and cultural exchange. Grants made to scholars from this program are generally known as "fulbrights." Walter Johnson, professor of history at the University of Chicago and senior author of this book, **The Fulbright Program: A History** (University of Chicago Press, Chicago, 1965. 396 pp., $8.50), served as a member of the Board of Foreign Scholarships from 1947 to 1954, including 3 years as chairman; since 1962 Johnson has served as a member of the U.S. Advisory Committee on International Cultural Affairs. The collaborating author, Francis J. Colligan, was executive secretary of the Fulbright Board from 1948 to 1957 and is currently director of policy review and coordination in the Bureau of Educational and Cultural Affairs of the Department of State.

This history of the Board's activities during the period when the authors were chairman and executive secretary, respectively, depicts a confused conflict of many pressures (chap. 6). Strong forces were exerted by those who sought to use the cultural exchange program as an instrument to achieve the immediate and short-range objectives of our national policy. The program as established by Congress was open to scholars in all fields of cultural activity without restrictions. The generosity and wisdom of the United States in establishing a program free from requirements of national interest and propaganda purpose attracted worldwide praise and participation. Supporters of this cultural exchange program strongly urged that the character of the original program should be preserved. In 1951 the Board approved the use of the program for immediate and short-range support of national policies, and to this end it increased the number of lecturers and urged the expansion of programs in American studies. Within 2 years, the Board was strongly protesting the plans of the Department of State to make the educational exchange the "hard core" of the government's information agency. Unfortunately, the conflicts that are chronicled here were not resolved in the decade that is covered in the remainder of the book. There is, however, a very hopeful item at the end of this chapter on conflict, which mentions a study in progress by Charles Frankel, Columbia University, that will be published very shortly. Since Johnson and Colligan's book was published, Frankel has been appointed Assistant Secretary of State for Educational and Cultural Affairs.

The authors' intimate association with the establishment of the Fulbright Program has enabled them to give a very personal and direct account of these problems and conflicts. This is particularly true of the dramatic report of the conflicts of the McCarthy era (chap. 7). In a world that is again filled with international conflict and strained relations, it is helpful to recall the history of difficult periods and to note the courage of Senator Fulbright and the role of the Board of Foreign Scholarships and other scholars in maintaining "a program of scholarship and intellectual creativity." In the preface to the book Senator Fulbright expresses his continuing concern that "unfortunately the distinction between education and propaganda is sometimes forgotten and pressures are brought to bear to use educational exchange for short range and shortsighted political purposes."

Between 1950 and 1955 the authors played an important part, assisted by the Cultural Affairs Officers and other officers of the U.S. Information Service, in arranging seminars and conferences to encourage programs in American studies. Aided by grants from the Rockefeller and Ford Foundations, the field of American studies has grown so much in the past 10 years that it is now the largest activity of the Fulbright Program. This has led to the establishment in many countries of councils or associations for American studies. The recently organized British Association for American Studies (BAAS) and the American Association for American Studies (AAAS) should not be confused with the two scientific organizations that have the same initials, the British Association for the Advancement of Science and the American Association for the Advancement of Science, both of which were established well over a century ago.

The presentation of the history is generally chronological, but this leads to a shift in style from that of a historical presentation to journalism as one includes current events. Much of the material in latter sections represents progress reports and work being planned to meet the recognized problems. This volume is not a statistical analysis of the program and of the trends that indicate its future course. There are no graphs, and the brief table in the appendix is not very useful.

Many scientists have had the assistance of a Fulbright grant for research, study, and educational experience abroad. The statistics given indicate that the number of American lecturers and research scholars going abroad each year has increased throughout the 20 years. This gives the misleading impression that the opportunity for a grant is now better than in the past. The budgets for most countries have remained fixed, and inflation of costs and stipends has reduced the number of grants. The number of countries participating has increased, but the grants per country have decreased. The Binational Commissions in most countries have designated the major portion of their grants for the support of special programs, and the number of unassigned grants available for scholars in general have decreased. This is especially true for Western Europe, where few new binational programs have been established. Other U.S. programs now exceed the Fulbright program in their support of special fields, but the total contribution of the Fulbright Program still leads in its broad support of educational and cultural exchange.

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Crustaceans

The excellent popularization of science published as the Smithsonian Scientific Series (1931) contained a section on crustaceans written by Waldo Schmitt, then curator of marine invertebrates at the U.S. National

Museum. The series has been out of print for many years.

Since his retirement from the Museum, Schmitt has revised his 1931 contribution, and we are fortunate to have available his outstanding general book, **Crustaceans** (University of Michigan Press, Ann Arbor, 1965. 204 pp., $1.95), this time published in the Ann Arbor Science Paperback Series.

The book is written in a style particularly suitable for the layman who is interested in biology; it has only a minimal amount of scientific jargon and technical terminology. The biologist will find that the book has a special appeal because it provides a myriad of personal observations by Schmitt, who has spent his life studying crustaceans.

In revising the book, Schmitt deleted certain sections and added others; however, the total effect is not particularly noticeable, except in the two chapters that deal with classification. Rather recent discoveries of new forms of crustaceans have led to the establishment of several new subclasses and the rearrangement of some orders.

My only criticism of this excellent book is that the reprinting of the halftones has not been uniformly successful. In a few instances, reducing the size of the illustrations used in the 1931 book has produced a halftone in which the crustaceans are difficult to see.

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Newton's Dynamical Researches, 1664 to 1684

Continuing a tradition well established by the essays of Rigaud and Ball on the *Principia*, John Herivel, in **Background to Newton's Principia** (Oxford Unversity Press, New York, 1965. 352 pp., $11.20), publishes a series of documents and introduces them with an essay. A good decade of research on the Portsmouth manuscripts by various scholars has made it possible for Herivel to publish, as Rigaud and Ball could not, all of the sources that bear on the development of Newton's dynamics until the composition of the *Principia*. The past few years have witnessed the publication of several Newtonian manuscripts, especially the *Correspondence* and the volume of papers edited by the Halls. Herivel's volume can legitimately take its place beside them. If the goal of publishing the entire record of Newton's dynamics has led to the inclusion of several items already available (some of them through Herivel's earlier work), several manuscripts of the greatest importance are published here for the first time. Newton's first steps in mechanics as recorded in an undergraduate notebook, the treatment of impact and other problems in the *Waste Book*, the lectures *De Motu* from 1684 or 1685—no one concerned with Newton can fail to appreciate the importance of these documents. And no one concerned with Newton can fail to appreciate Herivel's analyses of the technically more difficult papers, such as the vellum manuscript on gravity and centrifugal force, or the treatment of rotation in *The Laws of Motion*.

Some aspects of the work are more difficult to appreciate. When Herivel is not concerned with editing and analyzing individual documents, that is to say when he undertakes to explore in a connected essay the very topic promised in the title, the quality of the volume declines markedly. Indeed I can only say that Herivel's approach to dynamics in the 17th century lacks historical perspective. The very sureness of his grasp of dynamics appears to become an obstacle to historical understanding, and, rather than attempting to comprehend the problems as Newton defined them, he seems to be engaged primarily in showing how Newton arrived at results identical to those still employed. In chapter 5, "The motion of extended bodies," for example, he discusses Newton's early treatment of rotating bodies without a single reference that I could find to the state of understanding of the problem when Newton took it up. Considerable space is devoted to the issue of centrifugal versus centripetal force as though it were a problem wholly internal to dynamics. It appears clear, however, that Newton's shift from the word "centrifugal" to the word "centripetal" involved conceptual developments, not within mechanics proper, but within his philosophy of nature. As long as he thought of nature in terms of the mechanical philosophy in which impact alone could alter a body's motion, the concept of centrifugal endeavor offered the only avenue toward a quantitative treatment of circular motion. Once action at a distance was admitted (an admission Newton had not made as late as his letter to Boyle in 1679) centripetal force became both conceivable and quantifiable. His treatment of motion in general underwent a similar alteration. An early manuscript entitled "The laws of motion" concerned itself entirely with impact, whereas the *Principia* devoted a mere two corollaries to the subject. Herivel's discussion of dynamics contains no recognition whatever of these extradynamical considerations.

Perhaps the discussion is nowhere more disappointing than when Herivel takes up the subject of force. The volume is devoted to the development of Newton's dynamics, and the concept of force was the very heart of his contribution to the science. Herivel does not discuss the concept of force before Newton. He does not seriously examine the difficulties in Newton's concept, difficulties that one might expect to find illuminated by the record of their development. Much of the discussion appears to assume that the concept of force was the common property of the entire 17th century. Thus he says (p. 54) that Descartes supposed the endeavor away from the center in circular motion could have the effect of a force; in his example of a particle in a rotating tube, for example, the particle acquires an increasing outward motion, and how can this possibly occur in the absence of some force? "So that when he returns at the end of Art. 59 to the original case of a stone in a sling it is not surprising to find him employing the term *vis* in reference to centrifugal endeavour." If Herivel means what he appears to mean, I can only say that he should have been surprised.

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Herbs in History

Joseph Wood Krutch's **Herbal** (Putnam's, New York, 1965. 256 pp., $20) is a modern presentation of 100 woodcuts of plants and six of animals taken from Pierandrea Mattioli's *Commentaries on the Six Books of Dioscorides*, first issued in folio format in Prague